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...THE...

AMERICAN FERTILIZER

"That man is a benefactor to his race who makes two blades of grass to grow where but one grew before."

Vol. 96 MAY 23, 1942 No. 11

The Production and Use of Potash in America*

By R. H. STINCHFIELD

Washington, D. C.

WITHOUT potash, there would be no plant and animal life, because potash is one of the essential plant foods. Whether you live on a farm or in a city apartment, your welfare depends upon an adequate supply of this mineral, not only because of the plant products which you consume and wear but for the animal products without which our modern civilization could not exist.

It therefore has been deemed particularly fortunate that this continent is now independent of any foreign sources for its requirements of potash. Such was not the case during the first World War, prior to which all of this country's potash came from German mines. When the United States entered that war and these supplies were cut off, prices of potash rose from $35 per ton to $350 and in some cases $500 per ton and there was little to be had at any price. Growers became desperate in their efforts to get the material in order to meet the increasing demands for food. Out of that emergency came the roots of an American potash industry which has grown through the intervening years to a point where in this war lack of potash will not impede America's march to victory.

The Role of Potash

To fully realize how essential potash is to everyday life and particularly to the increased demands for food in any war effort, something of just what potash is and its role in plant life must be understood. According to Van Slyke, noted plant-food authority, the element potassium is never found in nature uncombined, only in compounds. It is a constituent of many minerals, and much of the potassium in the soil is not in a form available for plant growth. The word potash is almost universally used in agricultural literature referring to potassium compounds.

Plants require the element in relatively much greater quantities than do animals. It forms a larger part than any other mineral element in the ash of plants. While the role of potash has been the subject of intensive research for more than 100 years and still continues to be, it is known that potash is vital to the formation of starches and sugars and their transference to the storage parts of the plant. It is also necessary in protein synthesis and appears to be involved in a number of other reactions in the plant, many of which are not fully understood. Potash is credited with making the cell wall stronger and in the case of supporting tissue, makes the wall thicker. This gives strength to the stem parts of the plant, a particularly important feature in grain and fiber plants. It is also known that potash increases disease resistance of plants and enables them to better withstand unfavorable weather conditions, such as droughts and early frosts.

In fulfilling its numerous functions in the plant, potash exerts considerable influence on many of those factors which go to make up what is termed quality of the crop. It has been shown that by the use of sufficient amounts of potash, the shape, size, and cooking qualities of both Irish and sweet potatoes are greatly improved. Sugar beets and other root crops produce a better shaped root and

* Reprinted from "Better Crops with Plant Food," April, 1942.

usually have higher percentage of sugar. In the case of cabbage, potash produces a firmer, tighter head, and kraut made from the crop has a much better flavor.

The effects of a good supply of potash on cucumbers are very striking, the fruit being well shaped, while they are pointed and frequently club-shaped when insufficient potash is used. Tomatoes produce a fruit which is firmer, with more meat, better color, and more even maturity. There is less tendency for the fruit to crack. Celery is firm and crisp instead of stringy and tough. In the case of strawberries, potash gives the fruit more color and flavor and makes it carry much better, so that it comes on the market in a more desirable condition. Apples and peaches have a richer color and flavor and will keep longer in storage. Oranges that can get plenty of potash have a thinner rind and a much higher juice content.

A large amount of experimental work has shown very strikingly that potash is the biggest single factor in determining the quality of tobacco leaf. It improves the body and texture of the leaf and greatly improves the burning properties. The plumpness and test weight per bushel of wheat and other grains are increased by potash fertilization. It influences the protein and grazing quality of pasture by favoring the growth of clovers and legumes. Legumes have a very high potash requirement and when they cannot get enough of this nutrient, they tend to be weak and soon die off.

It has been shown that potash will increase the length and strength of cotton fiber, as well as increase yield and proportion of lint to seed. It controls cotton rust and aids in the control of wilt. With corn, potash reduces lodging of the plants and chaffiness of the ears. In the case of peas, the seed coats are more tender. Among the many other crops recorded as showing marked response to potash are prunes, apricots, walnuts, hops, cantaloupes, flax and grapes. This great influence of potash on the various factors entering into the quality of the crop has caused this nutrient to be termed the "quality" element in the fertilizer.

Potash in Fertilizer

In the fertilizer trade potash is signified as K_2O and is frequently used synonymously with potassium. Most of the potash used in the fertilizer in this country is in the form of potassium chloride, known in the fertilizer trade as muriate of potash. Since a majority of the soils which need fertilizers lack potash and frequently nitrogen, as well as phosphoric acid, most of the potash is applied in mixed fertilizers containing the other nutrients. In the plant-food analysis statement printed on every fertilizer bag, the first figure refers to the percentage content by weight of nitrogen, the second figure to the phosphoric acid, and the third figure to the potash. Thus a 3-8-8 fertilizer would contain 3% nitrogen, 8% phosphoric acid, and 8% potash. The analysis is always given in the same order.

Use of Potash

Industries using potash include the chemical industry, tanning and dyeing, electroplating and photography. Potash is needed for medicine, metallurgy, and the manufacture of glass, soap, matches, paper and explosives. However, more than 90% of all the potash produced is used in fertilizers.

The first use of potash in agriculture is not recorded. It is known that long before this country was colonized, the Indians had discovered that on spots where there had been a bonfire, plants grew better, and in Europe and Asia wood ashes, which contain from 3 to 8% potash, had been used on gardens for centuries. America's first potash industry grew out of the burning of great quantities of wood cleared by the Colonists and the leaching of these ashes in pots (from which it is assumed the word potash originated). This potash was used for making soap, gunpowder, and glass, and was exported to the older sections of Europe for similar purposes. As early as 1810, the value of the exported potash had reached a figure of more than one and one-half million dollars. This industry died when the forests dwindled and potash began to be imported from Europe.

It was not until 1840 when Justis von Liebig reported that plants through their roots fed upon minerals in the soil that potash was recognized as an important plant nutrient. Liebig disclosed that potash is one of the principal constituents in the ash of all plants and emphasized the fact that since plants use such large amounts, soils should be well supplied with potash. At about the same time the large deposits of potash in Stassfurt, Germany, were discovered while drilling for salt, and in 1860 the first plant for the processing of these crude salts was built. The development of this industry gave Germany almost a monopoly on potash until the first World War.

During that war, the scarcity of potash in America and the prices which had skyrocketed for any that could be obtained led to attempts

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WAR EMERGENCY CONFERENCES

San Francisco

Fifty-nine persons, including some 20 agricultural workers, attended the conference held at San Francisco on May 12th. Charles J. Brand presided and made an opening statement regarding the general fertilizer situation. T. E. Milliman discussed the objectives and work of OPA and WPB, the recent price orders, and the allocation of nitrogen, and urged cooperation between the land-grant colleges, other agricultural agencies, and the industry. H. R. Smalley spoke on agronomic progress, the work of the agronomist in the present emergency, and the educational work of the Association. At the luncheon Dr. Alvin Cox, chief, Bureau of Chemistry, State Department of Agriculture, presented figures showing the consumption of different kinds of fertilizer in California during the past five years and the approximate consumption by crops. Prof. W. R. Schoonover, extension agronomist, discussed the fertilizer situation in California as it is related to the agricultural goals, and Weller Noble urged that in so far as possible local problems be dealt with at home in order to relieve, as much as possible, the pressure on Washington officials. Dave Davidson, State chairman of the USDA War Board, stated that his Board would welcome the appointment of a fertilizer advisory committee.

Seattle

The conference of District 11 producers and official State and Government workers which was held at Seattle on May 14th was attended by 27 persons. Mr. Brand presided and made the opening statement, and T. E. Milliman made his usual clear statement concerning the work of the war agencies. It was a very informal meeting, and Mr. Milliman was asked and answered many questions. H. R. Smalley discussed agronomic progress, and Karl Baur, agronomist, Western Washington Experiment Station, described some new experiments on fertilizer application which have just been started in cooperation with the Bureau of Agricultural Chemistry and Engineering. Experiments conducted on peas last year have shown the great value of correct application.

This was the ninth and last of the series of War Emergency Conferences which, beginning on March 4th, have been held at Amherst, Mass.; Rocky Mount, N. C.; New Orleans, La.; Atlanta, Ga.; Philadelphia, Pa.; Chicago, Ill.; Los Angeles, Cal.; San Francisco, Cal.; and Seattle, Wash.

The N. F. A. Convention

The Homestead, Hot Springs, Va.
June 18, 19 and 20, 1942

The program for the annual convention of the National Fertilizer Association is being rounded out into what promises to be one of the most important meetings ever held by the Association. Since the previous annual convention the industry has gone through a fall and spring season filled with unexpected problems, short-notice government regulations made necessary by the war effort, transportation problems and many others. The way in which the industry has functioned under these handicaps and has continued to deliver in normal volume the plant food so necessary to this country and our allies, is most gratifying.

At the coming meeting at Hot Springs, Va., will give a needed opportunity to review the events of the past 12 months, discuss the various "bottlenecks" which appeared from time to time, and formulate plans of even better coordinated effort during the coming year.

The change of place from White Sulphur Springs, W. Va. to Hot Springs, Va., was made necessary by the inability of the Government to evacuate the Axis diplomats who have been quartered at the former resort since last December. It was also necessary to advance the dates of the meeting by 10 days, with the result that the sessions will be held on Thursday, Friday and Saturday, June 18th, 19th and 20th.

The Homestead has given special rates for this convention, a single room with bath being $11.00 per day, American plan, and a double room with bath $20.00 per day. The greens fee for the Cascades golf course will be $2.00 with transportation to and from the hotel. Reservations for rooms should be made direct to the hotel management.

On the railroads, summer tourist rates to Hot Springs will be in effect from practically all points in the United States. In Central, Trunk Line, and New England territories, summer tourist tickets are on sale daily. In Southeastern territory, tickets are on sale daily, good for 30 days from date of sale. In Southwestern territory there is a 30-day limit on summer tourist tickets to Hot Springs. In Western territory, 30-day excursion tickets to Chicago or St. Louis should be purchased, and summer tourist tickets from there to Hot Springs. Thirty-day excursion tickets may be purchased on the same basis as were the former 10-day excursion tickets. Transcontinental territory tickets are good for three months.

Nitrogen Sub-committee Meets

A meeting of the Nitrogen Subcommittee of the Fertilizer Industry Consulting Committee was held at Washington on Wednesday, May 6, 1942. Herbert H. Meyers, WPB, presided. Also present during all or part of the day: N. E. Harman, Sidney B. Haskell, M. H. Lockwood, John E. Sanford, Oscar F. Smith, and J. A. Woods, members of the subcommittee, and Weller Noble, member of the general committee; George Cushman, OPA; T. E. Milliman and George McCarty, WPB; S. B. Akins, Carl C. Farrington, P. H. Groggins A. L. Mehring, T. R. Moyer, W. F. Watkins, and E. D. White, U.S.D.A.; F. S. Lodge and D. S. Murph, N.F.A. The object of the meeting was to discuss distribution and handling of fertilizers for next year, particularly with respect to nitrogen, around which the problem seems to revolve because of conditions with respect to supplies of fertilizer materials.

Use of oil meals (1942-43 production expected to exceed 1941-42 production by 1,800,000 tons) as feeds and as fertilizer, under present war conditions, was discussed. It was pointed out that, because of much higher cost of organics, it would not be possible for fertilizer manufacturers to substitute organics for chemical nitrogen in mixed fertilizers, except at increased prices. Possibilities to meet this situation: (1) subsidy of oil meals going into mixed fertilizers; (2) adjustment of maximum prices of mixed fertilizers containing additional quantities of oil meals so as to take care of the additional cost. Concensus seemed to favor the latter. It was indicated that OPA does not look with favor, at the moment, upon such an adjustment of prices but would give careful consideration to the problem and would welcome full discussion. It was suggested that certain provisions of Maximum Price Regulation No. 135 [Section 1367.31, subsection (b) (4); Section 1367.39, subsections (a) (8) and (9)] might be used by a fertilizer manufacturer to establish a maximum price for a mixed fertilizer of a "grade" for which a maximum price was established by the Regulation but of a different "kind" in that it would contain a higher percentage of water-insoluble nitrogen obtained from oil meals—such a "kind" of fertilizer being regarded as a new product, for which no maximum price was established by the Regulation.

Interchanging use of nitrate of soda and sulphate of ammonia, using the former near landing points and the latter near points of production, in order to conserve transportation facilities and save expense, was discussed. U.S.D.A. representatives tentatively suggested, as a guide for six-months' program from July 1st, the allocation of 45 per cent of available nitrogen for top-dressing and the rest for mixed fertilizer.

The ideas outlined by representatives of U.S.D.A. at the meeting of the general committee on April 30th, with reference to rationing fertilizers to farmers, were developed in more detail, and three possible courses, according to their present way of thinking, were presented: (1) If the supply of nitrogen should be sufficient to meet the demand, which is a possibility, there will be no necessity for rationing fertilizers to farmers. (2) If the supply of nitrogen should be fairly close to the demand, say 400,000 tons, rationing to farmers might not be necessary—some unessential uses might be eliminated. (3) If the supply of nitrogen should be less than 400,000 tons, rationing to farmers would be desirable, in order to reach the production goals and to obtain satisfaction among farmers as to the distribution of the available supply.

If rationing to farmers should become necessary, U.S.D.A. would offer to OPA the services of its County War Boards. It would be the plan to work out through such Boards, perhaps with the assistance of (AAA) subcommittees, for each individual farmer a production plan for his farm and then to give him a ration card indicating what fertilizers, and how much, he would be permitted to buy; he could then go to any local dealer of his choice to buy them. Fertilizers would be channeled through the mixers to the dealers, with some control and coordination among mixers as to what and how much would go to a particular area. Various problems and difficulties that would arise in connection with rationing to farmers were discussed.

The Government agencies represented at the meeting requested the cooperation of the subcommittee and the fertilizer industry in meeting the problems presently involved in the handling and distribution of fertilizers. The industry was challenged to formulate and submit their suggestions as to how fertilizers should be rationed to farmers if and when this course should become necessary. Industry members of the nitrogen subcommittee are expected to meet at an early date for further consideration of this problem.

Fertilizers for Vegetables and Fruits*

Missouri Farmer Discusses Fertilization Tomatoes and Cantaloupes

L. F. Chiders of New Franklin, Missouri, believes that every farmer should operate his own experiment station, within limits. Thus in 1938 he applied superphosphate to one plot and a 4-10-6 fertilizer to another plot of tomatoes and cantaloupes. He noted that the tomatoes from the superphosphate plots were off color, the flesh contained many hard lumps and the flavor was flat, whereas those on the "Potash-ed" plots were firm, well formed, highly colored with a healthy red blush and there were no cracks around the stem end and rarely a blossom end defect. Abount 90 per cent of these fruits were perfect. The superphosphate cantaloupes waged a losing battle with the drought, he advised. Neither field yielded well but the vines on the "Potash-ed" field withstood the drought fully three times as well as the phosphated vines and the aroma and sweetness of the melons were markedly superior.

Manured Tomatoes Require Liberal Potash Fertilization

Manure for tomatoes should be reinforced with potash according to Dr. J. B. Hester, Soil Technologist, Campbell Soup Research Laboratory. For example, on one farm the check plot, no fertilizer, yielded 15.9 tons as compared to 15 tons with 1,500 pounds of 4-16-0; 20.8 tons when the same amount of a 4-16-8 fertilizer was applied; and 22.0 tons when 1,500 pounds of a 4-16-16 mixture were used. This farm has a large herd of dairy cattle and the fields on which the tomato crop was grown were spread with a heavy application of manure. On another farm in Pennsylvania where a heavy application of hog manure was spread, the check plot yielded 21.4 tons; 1,000 pounds of a 4-16-0 yielded but 20.8 tons or less than the check which received no fertilizer. When 1,000 pounds of a 4-16-8 were applied the yield was the same as the second plot, but when 1,000 pounds of a 4-16-16 were used the yield jumped to 25.6 tons per acre.

How Ed Noller Fertilizes Tomatoes

Ed Noller, Freehold, New Jersey, in 1941 grew 10.6 acres of tomatoes and averaged 19.7 tons to the acre. On a field that was in cabbage and parsnips in 1939 and tomatoes in 1940, Noller broadcast 1,000 pounds of hydrated lime to the acre in April, 1941 on a rye cover crop. He then applied 7½ tons of horse manure and plowed it down. After disking, 1,000 pounds of a 4-8-10 fertilizer per acre were broadcast and harrowed into the soil. The plants were set May 1st with a transplanter. Four weeks later an application of 500 pounds of a 5-10-10 fertilizer per acre was made with a riding cultivator. This was followed by another application of 250 pounds of the same analysis four weeks after the second application. Noller is following recommended practices, but quite frankly admits—"One has just got to have faith in the weather."

Maryland Tomato Queen Earned Coveted Title

Mrs. Rowena Tull of Talbot County, Maryland, in 1941 grew the largest officially recorded tomato yield ever harvested in Maryland, averaging 21.16 tons per acre on 6.92 acres. The field had been in wheat in 1939 followed by clover. Turkeys, 2,000 of them, ranged the field from July to December. After plowing under 12 to 15 tons of hog manure per acre in April, 1941, the ground was thoroughly conditioned. A 3-8-10 fertilizer was used and applied with a corn planter which was used to mark off the field, 225 pounds per acre being put on in each direction.

Fertilize Your Vegetable Garden

Professor J. M. Huffington, Vegetable Extension Specialist at State College, Pennsylvania, recommends the following fertilizer treatments for the home vegetable garden. On very fertile soil with manure use 16 or 20% superphosphate; on very fertile soile with chicken manure use 0-14-6. On average or medium soils with manure, use 4-16-4, 4-12-4, or 3-12-6. On sandy or shale soils or medium soils without manure, use 5-10-5 or 5-10-10. The above should be applied at the rate of approximately 800 pounds per acre.

Asparagus Fertilization Essential

Professor C. H. Blasberg, University of Vermont, in advising farmers on the fertilization of asparagus, writes, "Asparagus should be fertilized early in the spring and again in mid-summer, when cutting is discontinued. The amount of fertilizer to apply will, of course, depend upon the natural fertility of the soil as well as the analysis of the material used. A pound of 5-8-7 fertilizer to every 40

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*From the "Potash News Letter" published by the American Potash Institute, Washington, D. C.

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War Activities of the National Fertilizer Association

The war emergency has greatly changed the emphasis of the work of the National Fertilizer Association. A large portion of the time of the staff is now being devoted to conferences with government officials, committee meetings, personal and telephone interviews, supplying information requested by government offices, and in industry and agricultural meetings involved in planning the industry's part in the national war effort and its welfare after the war.

A brief summary of the war emergency activities is as follows:

Assisted in creation of Fertilizer Industry War Emergency Advisory Committee; collaborated in holding the panel meeting when the committee was selected, three full committee meetings and four subcommittee meetings. This is the over-all policy and guidance committee. It is composed of 15 leaders in the mixed fertilizer, superphosphate, nitrogen, potash, sulphuric acid, and phosphate rock industries.

Provides government agencies with statistical and other industry information as to productive capacity, processes, grades, plant-food content, rates of application, sales, trade practices, materials, containers, and commercial and technological operations of the industry with a view to coordinating government policies and procedures with industry needs.

Assisted government to make the most complete census and analysis of the superphosphate and fertilizer sulphuric acid industries ever made.

Makes daily contacts with the War Production Board, Office of Emergency Management, Office of Price Administration, Office of Agricultural War Relations, Office of Defense Transportation, Export Control, Maritime Commission, and other agencies, for the purpose of obtaining and providing information and bringing about adjustment or clarification of regulations to meet the business needs of the industry.

Issues, from time to time, a release called "Fertilizer War Notes," at the request of government war agencies. These notes inform members of the industry, and agricultural officials, concerning supplies, distribution, and government actions and policies. Total of the mailing lists is about 2,500.

Obtains and distributes promptly to members for their guidance, government orders relating

to allocations, price ceilings, and other subjects. This requires daily examination of scores of government releases.

Consults with Divisions of Office of Defense Transportation to obtain clarification of ODT orders affecting industry operations and to seek relief from impossible and impractical requirements of such orders.

Provides members with information concerning nitrogen and other supplies, priorities, allocations, and purchasing operations of AAA.

AAA SUPERPHOSPHATE BIDS POSTPONED

The opening date of bids on 350,000 tons of superphosphate to be used by the Agricultural Adjustment Administration in the agricultural conservation program has been indefinitely postponed, pending clarification of the effect of the price ceiling orders of the OPA on such transactions. Ample notification will be given the bidders as to when these bids will be opened.

The AAA has also sent out invitations to bid on 80,000 tons of 0-14-14 for use in the program during the period from July 1 to December 31, 1942. Bids are to be opened at some future date, to be announced later.

TAYLOR JOINS WAR PRODUCTION BOARD

On June 1st, Henry L. Taylor, well-known fertilizer materials broker of Wilmington, N. C., will close his brokerage office and join the Nitrogen Section of the War Production Board at Washington. He will work under H. H. Meyers, Chief of the Nitrogen Section. During his war service, Mr. Taylor's home address will be R. F. D. 1, Alexandria, Va.

COTTONSEED MEAL PRODUCTION

The shortage of chemical nitrogen has focussed interest on the various organic forms of this fertilizer element. During the past nine months, from August 1, 1941 to April 30, 1942, production of cottonseed cake and meal has amounted to 1,620,649 tons, as compared with 1,780,804 tons for the same portion of the previous crop year. Shipments during the same period of 1941-42 totaled 1,473,690 tons, leaving a supply on hand, April 30, 1942, of 311,403 tons. Production of hulls during the same months amounted to 921,632 tons.

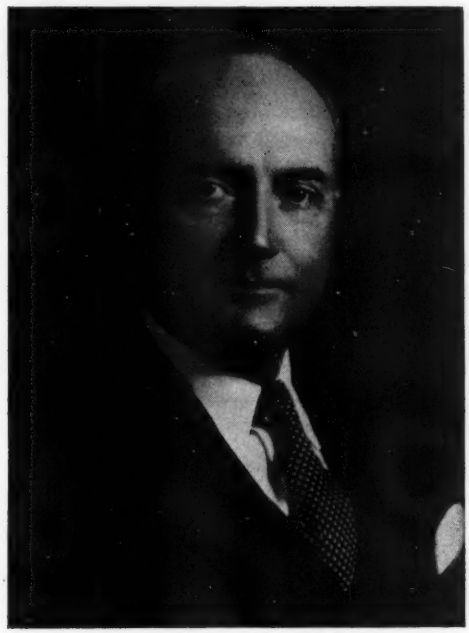
GEORGE W. McCARTY APPOINTMENT CONFIRMED

George W. McCarty, of Ashcraft-Wilkinson Co., Atlanta, has recently received official notification from Donald M. Nelson, Chairman of the War Production Board, of the confirmation of his appointment as Assistant to Chief Nitrogen Unit of WPB.

Nitrate of soda has been under allocation since January 1st last, and has been distributed pro rata to fertilizer users based on their previous years consumption.

Effective immediately, all inorganic nitrogen is being taken over by the Government and will be allocated by the Nitrogen Unit of WPB.

Fortunately, other fertilizer ingredients are not similarly affected at this time, as there is no apparent shortage in either superphosphate or potash. Nitrogen is the only critical item at present.



GEORGE W. McCARTY

Mr. H. H. Meyers is Chief of the Nitrogen Unit, so upon him and Mr. McCarty will fall the responsibility of the distribution.

The demands of the Army and Navy come first, along with that of essential war industries, with agriculture still getting a substantial share.

Mr. McCarty is on leave from his firm, Ashcraft-Wilkinson Company, and has been in Washington since early February.

MARCH SULPHATE OF AMMONIA

The figures of the U. S. Bureau of Mines show production of by-product sulphate of ammonia continuing at about 2,000 tons per day. Production for the month totaled 65,216 tons, an increase of 11.3 per cent over the shorter month of February. For the first quarter of the year, production was ahead of the same period of 1941 by only about 1 per cent.

Shipments during March were 67,783 tons, about 2,500 tons higher than production. Consequently stocks on hand at the end of the month totaled 15,574 tons as compared with 18,300 tons on February 28th.

The detailed figures for sulphate of ammonia and ammonia liquor are as follows:

	Sulphate of Ammonia Tons	Ammonia Liquor Tons NH_3
Production:		
March, 1942	65,216	2,886
February, 1942	58,598	2,605
March, 1941	64,524	2,745
January-March, 1942	189,362	8,395
January-March, 1941	187,552	7,749
Shipments:		
March, 1942	67,783	3,204
February, 1942	61,706	2,950
March, 1941	74,120	2,885
Stocks on hand:		
March 31, 1942	15,574	745
February 28, 1942	18,300	786
March 31, 1941	32,645	903
February 28, 1941	41,928	756

HEINICKE APPOINTED HEAD OF N. J. EXPERIMENT STATION

On September 1st, Dr. A. J. Heinicke, head of the Pomology Department at Cornell University for the past 21 years, will become director of the New York State Agricultural Experiment Station at Geneva. Dr. Heinicke, a graduate of the University of Missouri and of Cornell University, has been quite active in the investigation of fertilizer requirements of fruit crops and has frequently addressed New York fertilizer conferences.

CURB ON PHOSPHATE ROCK INVENTORIES IS REMOVED

Restrictions against the accumulation of heavy inventories of phosphate rock were removed on May 11th by WPB to permit users to take advantage of transportation facilities when available. The order follows:

"General Inventory Order M-149—(a) Exception to general inventory restrictions. Notwithstanding the provisions of any regulation or order heretofore issued by the Director of Priorities of the Office of Production Management or by the Director of Industry Operations of the War Production Board, or any other regulation or order which may hereafter be issued but which does not expressly relate to phosphate rock, any primary producer may make deliveries of phosphate rock, and any person may accept deliveries of phosphate rock from a primary producer, although the inventory of phosphate rock in the hands of a person accepting such delivery is, or will by virtue of such acceptance become, in excess of a practicable working minimum.

(b) Applicability of Priorities Regulation No. 1. Except to the extent that the provisions of paragraph (a) of this section are inconsistent therewith, all transactions involving phosphate rock shall be subject to the provisions of Priorities Regulation No. 1 (Part 944), as amended from time to time.

(c) Definition. "Primary producer" means a person who mines phosphate rock.

(d) Effective date. This order shall take effect at once and shall continue in effect until revoked by the Director of Industry Operations."

FERTILIZER MATERIALS MARKET

NEW YORK

Allocation of Sulphate of Ammonia Decided Upon. Completion of Present Contracts Uncertain. Potash Supplies Seem Ample. Interest in Organics Increases.

Exclusive Correspondence to "The American Fertilizer."

NEW YORK, May 20, 1942.

The prohibition of the use of ammonia liquors in fertilizers and the uncertainty of the supplies of nitrate of soda, due to transportation difficulties, means that sulphate of ammonia is the only inorganic nitrogen which the fertilizer manufacturer is reasonably certain to obtain during the new season.

With this in mind, the OPA, the WPB and the U. S. Department of Agricultural invited representatives of manufacturers and distributors of sulphate of ammonia to meet with them in Washington on May 19th.

At the meeting it was definitely disclosed that sulphate of ammonia would be allocated for the new fertilizer year, such allocation to be made on the basis of the average yearly quantity of inorganic nitrogen used over the last three years. All fertilizer manufacturers will probably receive a questionnaire shortly requesting the necesssary information so that allocation can be worked out.

However, the U. S. Department of Agricultural will decide from time to time in what parts of the country the nitrogen is most needed for the production of most necessary agricultural products and this would then have a definite bearing on the allocation.

As to the price, this is not quite clear but probably contracts will be made at the same prices, terms and conditions as contracts during the present year and probably all manufacturers will have to take some of the long haul business along with the more profitable nearby deliveries.

Deliveries of sulphate of ammonia against present contracts are still considerably behind and now looks as if, in many cases, manufacturers will not be able to complete the present contracts before the new allocation program goes into effect and this will probably mean the cancellation of all undelivered tonnage as of such time.

Potash

The movement of this material continues but buyers are anxious to take in total quantities for which they have contracted. There has been no indication as yet as to the price for the new season but the general feeling is that there will be no material increase. It does not appear, at the moment, that there will be any necessity for the allocation of potash.

Nitrogenous

Fertilizer manufacturers are showing considerable interest in all the various organic ammoniates and some bookings have already been made for certain nitrogenous materials with the probability that a considerable portion of the manufacturers' output will be booked before long.

BALTIMORE

Spring Tonnage About Normal. Sulphate of Ammonia Scarce and Organics in Better Demand. Increase in Superphosphate Prices Probable.

Exclusive Correspondence to "The American Fertilizer."

BALTIMORE, May 9, 1942.

The spring fertilizer season is now drawing to a close, and from all indications it would appear that the tonnage compared favorably with last year.

Ammoniates.—The market on dry rendered tankage is ruling slightly easier at about $6.65 per unit of nitrogen, while wet rendered tankage is also less firm at $6.20 per unit of nitrogen and 10 cents per unit of B.P.L., which, of course, still takes it out of the class of fertilizer material.

Nitrogenous.—Unless there is a change in conditions and producers of liquid ammonia make more substantial deliveries during the coming season, there is likely to be an acute shortage which would throw an added burden

on nitrogenous material which is the next cheapest ammoniate on the market. There is no change in price which is nominally $4.00 per unit of nitrogen, f.o.b. Baltimore.

Sulphate of Ammonia.—None of the fertilizer manufacturers are able to secure normal supplies, and most of them anticipate that there will be further curtailment another season. This situation together with decreased quantities of ammoniates for fertilizer will doubtless make for a shortage when another season rolls around. No new schedule of price has been announced and probably will not be until sometime next month.

Nitrate of Soda.—While the market remains unchanged, fertilizer manufacturers are finding it increasingly difficult to secure supplies of either the domestic or Chilean product, which is being rationed out very sparingly, with no indication of any easing up in the situation in the near future. The present market of the Chilean product continues at $33.00 per ton of 2,000 lb., in 200-lb. bags, ex store Baltimore.

Fish Meal.—While there have been reports of further sales of new season's crop of menhaden fish, the tonnage sold ahead is much less than usual, doubtless due to the high ceiling prices and small spread between cost of scrap and the market on meal, which makes business unattractive to usual dealers.

Superphosphate.—Ceiling price seems to be established on this commodity at $9.60 per ton of 2,000 lb. for run-of-pile, basis 16 per cent, and $10.10 for flat 16 per cent grade, in bulk, f.o.b. seller's works Baltimore, although it is understood some of the producers are not in position to supply 16 per cent grade. Based on increased cost of production due to necessity of railing both sulphur and phosphate rock to Baltimore instead of taking it by water, none of the manufacturers are anxious sellers at present levels, and it would not be surprising to see ceiling prices advanced to take care of this situation.

Bone Meal.—There is nothing new, and practically no raw or steamed bone meal is offering on the market. Last price of 3 and 50 per cent steamed bone meal figured about $41.00 per ton, f.o.b. Baltimore.

Potash.—While producers usually announce their new schedule of prices at this time of the year, up to the present time this has not been done, although it is anticipated by most that before the end of the month various manufacturers will announce new schedule. There have been rumors that if the Government desires to hold prices down to present levels, it will be necessary to subsidize domestic producers, due to the increased cost of production.

Bags.—There is no new interest being shown in burlap bags as there are practically none offering on the market, and most of the manufacturers are turning their attention toward paper bags as far as possible. Unless there is material change in conditions and burlap is again received from India in large volume, it looks as though the quantity of burlap bags used by fertilizer manufacturers this year will be quite small.

ATLANTA

Ceiling Prices Prevent Change in Markets. Few Offerings of Fish Scrap on Market.

Exclusive Correspondence to "The American Fertilizer."

ATLANTA, May 18, 1942.

Since ceiling prices have been put into effect, there naturally has been little change in the general markets.

South American Blood. — About $5.40 ($6.56½ per unit N), c.i.f. ports.

Imported Tankage.—About $5.40 ($6.56½ per unit N) and 10 cents, c.i.f. ports.

Domestic Nitrogenous.—$3.25 ($3.95 per unit N), western producing points.

Menhaden Scrap.—Few offerings at ceiling price f.o.b. producing points but nothing now on market.

Acidulated Scrap.—Few spot sales reported at $4.50 ($5.47 per unit N) and 50 cents, f.o.b. producing point, but nothing offered now.

Sulphate of Ammonia.—Continued interest, but no resale lots on market to speak of.

Nitrate of Soda.—Allocated by OPM; no change in price.

Cottonseed Meal.—Prime 8 per cent, $38.00, southeastern mills.

CHARLESTON

No New Material Prices Announced for Coming Season. Shipments of Foreign Organics About Ceased.

Exclusive Correspondence to "The American Fertilizer"

CHARLESTON, May 19, 1942.

All buyers are awaiting future prices on nitrogenous, potash, and sulphate of ammonia. No prices on superphosphate have yet come out in this section.

Nitrogenous.—Supplies of this continue fairly scarce. The market is around $3.25 per unit of ammonia ($3.95 per unit N), f.o.b. western point; $3.60 per unit of ammonia ($4.35½ per unit N), f.o.b. one southeastern port, spot, but limited supply.

Blood.—Imports from South America have practically ceased, due to shortage of ships. There is hardly any chance of a change in this situation until after the war. Chicago market, $5.70 per unit of ammonia ($6.93 per unit N).

Fish Meal.—The price of this material is quoted at $72.50 per ton for the 60 per cent grade protein, f.o.b. Chesapeake.

Cottonseed Meal.—The 8 per cent grade is quoted at $39.00, Atlanta; $35.00, Memphis.

CHICAGO

Interest in Fertilizer Organics Increases but Sellers Cautious. Feed Material Markets Continue Strong.

Exclusive Correspondence to "The American Fertilizer."

CHICAGO, May 18, 1942.

Renewed interest in organics has developed and sales for fairly early deliveries of nitrogenous and sludge are reported at varying prices; all of which obviously being under the March high. Sellers now show but little further desire to sell; particularly, they claim, as continued inquiry indicate the possibility of stronger future markets.

Feeding material markets continue strong in tone, with little being offered. The finished feeds are reported moving freely in this territory at ceiling prices.

Nominal prices are as follows: High grade ground fertilizer tankage, $4.00 to $4.25 ($4.86 to $5.16½ per unit N) and 10 cents; standard grades crushed feeding tankage, $5.50 to $5.60 ($6.68½ to $6.80½ per unit N) and 10 cents; blood, $5.65 to $5.75 ($6.87 to $6.99 per unit N); dry rendered tankage, $1.17½ to $1.22½ per unit of protein, Chicago basis.

TENNESSEE PHOSPHATE

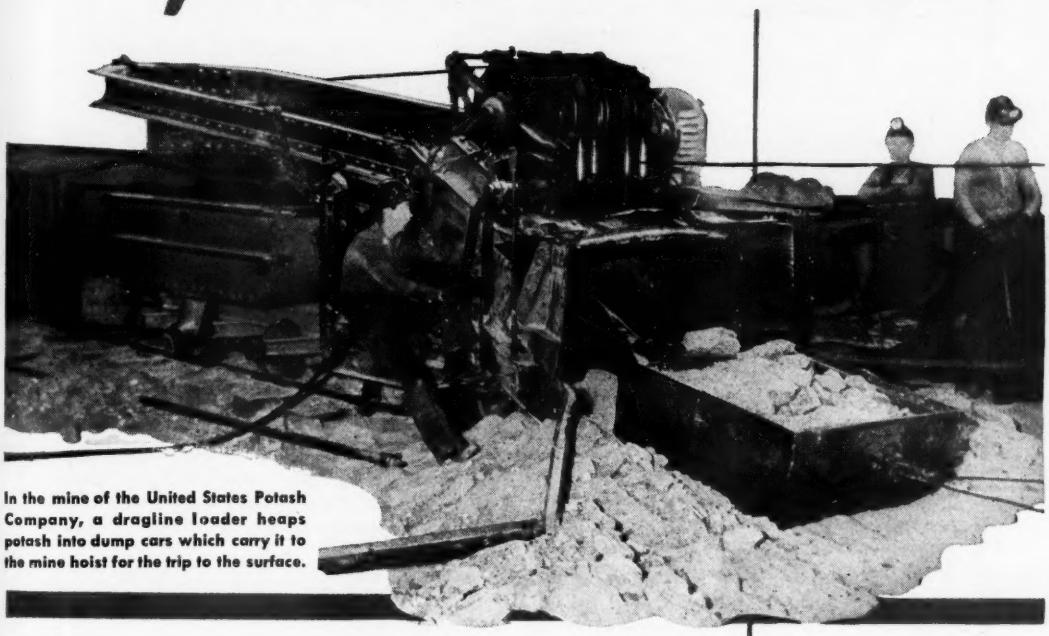
Phosphate Rock Output at Record Peak in 1941. Shipments Active to All Consuming Channels. Prices to Advance July 1st.

Exclusive Correspondence to "The American Fertilizer."

COLUMBIA, TENN., May 18, 1942.

The latest Mineral Market report of the Department of the Interior, Bureau of Mines, shows that 1941 topped all records for marketing of domestic phosphate rock, nearly two-thirds of a million tons—more than the previous all time record year of 1920. The Tennessee output for 1941 was 1,254,000 short

BUMPER CROPS START 1,000 FEET DOWN



In the mine of the United States Potash Company, a dragline loader heaps potash into dump cars which carry it to the mine hoist for the trip to the surface.

From the depths of the Earth comes the potash that means healthy crops to farmers all over America.

Blasted from the face of deposits thousands of years old, the potash ore is crushed, screened and refined to produce Higrade Muriate of Potash and other grades needed by fertilizer manufacturers.

This vital plant food, so necessary to unfailing soil fertility and to resisting the effects of disease and drought, has long helped the nation's farmers produce finer fruits, vegetables and crops of every kind.

Today potash is more important than ever in satisfying America's growing demand for healthful agricultural produce.

United States Potash Company, Incorporated, 30 Rockefeller Plaza, New York

HIGRADE MURIATE OF POTASH
62/63% K_2O
Also 50% K_2O Grade
MANURE SALTS
22% K_2O Minimum

SUNSHINE STATE POTASH
A PRODUCT OF NEW MEXICO U.S.A.

Trade-mark Reg. U. S. Pat. Off.

tons, and the rate of shipment so far in 1942 has far exceeded that of 1941.

At present the entire production of Monsanto, Victor and TVA plants are said to be devoted to supply of the War and Navy Departments for war purposes.

Shipments are still going at an active rate to all channels of consumption, the largest amount going to the three plants above named, with superphosphate manufacturers, feed manufacturers, foundry supplies and farmers for direct application to the soil, in the order named. The latter channel is at the highest peak yet reached and shippers are far behind in shipping schedule, with the largest tonnage of unfilled orders on hand in the history of the field.

The next two or three months will see most of the carry-over orders either filled or postponed for fall shipment, and the hoped-for opportunity may be offered for the producers to fill up their present clean-swept stockhouses in readiness for their usual ability to fill orders the day they are received, which of course can only be accomplished with a stockhouse full of material ready to ship.

There has been an advance of 50 cents per ton on all grades of ground rock, effective July 1st.

A large amount of prospecting of phosphate properties for additional reserves is under way by most of the large mining companies, all of whom have let their reserves drop considerably and are now having to pay much larger prices for properties than they could have been bought for, seven to ten years ago. Numerous transactions will likely be put on record in the next few weeks covering large acreages in Hickman, Williamson and Maury Counties.

Good progress is being made on the large mining plant of the TVA on the Akin place and on the sintering plant at Godwin. Much interest is manifested in this operation, in which the water is pumped several miles from Duck River to the Akin place, used to wash the rock and fines there, and then the washed product is pumped several miles through pipe to Godwin for sintering and shipping to Muscle Shoals.

50 cents advance per ton is effective July 1st on all grades of ground rock.

Due to the astonishing number of uses for American cotton opened up by the war effort, consumption of this crop is now at the rate of 11,500,000 bales per year, compared with a normal consumption of 6,000,000 bales.

TO HELP MAKE CONVEYOR BELTS LAST LONGER

Chain Belt Company announces a new self-aligning idler for flat conveyor belts, both return and carrying, which will help to keep the belt central on its supporting idlers, important for longest possible life from a conveyor belt.

The operation of this self-aligning idler is sensitive and instantaneous. If for any reason, the conveyor belt runs to one side it has a tendency to swivel the idler in a horizontal plane. If this in itself is not sufficient to cause the idler to swing enough to force the belt to throw back immediately, the belt will continue traveling to one side until it contacts the counterweighted end disc, which is slightly larger in diameter than the idler roll. Contact with the counterweight tends to rotate it, but since it is a counterweight it resists this tendency to rotate and produces a counterforce on the idler. This causes the idler to swivel rapidly, throwing the idler more out of line which then immediately forces the belt to swing back the other way.

These Rex flat belt self-aligning idlers are sturdily built units, using the same principle of construction as the Rex self-aligning troughing idlers that have been very successful. No side guide rolls to impose unnecessary wear on the belt edge are used. Where excessive misalignment of a conveyor belt exists, caused by such factors as stretch or weave in the belt, uneven loading of material on the belt, or shifting of the conveyor frame, Rex self-aligning idlers spaced at intervals between the stationary idlers will automatically bring the belt back to the central position, and avoid the possibility of serious injury to the conveyor belt.

PRODUCTION AND USE OF POTASH IN AMERICA

(Continued from page 6)

to recover the element from all possible sources. These included industrial wastes from the cement, iron, beet sugar, alcohol, tobacco, hardwood, and wool industries and from kelp and brines. More than 70 plants sprang up, producing potash at high cost but still meeting only a small fraction of the demand. Following the armistice and the reimportation of potash from Europe, all but three of these domestic producers were forced to close for economic reasons. These three included the production of potash from brine and the small amounts recovered from the wastes of the cement and alcohol industries.

The one American producer of any volume to survive was the plant at Searles Lake, California, where potash is being extracted from the brine of a dried-up salt lake, with side products of borax and other industrial chemicals. However, the search for deposits in the United States which had begun during the war continued, and in 1926 the Government appropriated enough money for exploring areas in Texas and New Mexico. There, in what is known as the Permian Basin, rich beds of potash salts were discovered lying at a depth of about 1,000 feet underground. Subsequently a company was formed for the mining of these salts, and in 1931 another company was formed. The third important producer in this area began the marketing of its products late in 1940.

At the Searles Lake plant, brine is pumped from wells drilled in the crystal body of the lake. This brine is piped innto evaporators where the potash is separated from other constituents. A high-grade muriate of potash is produced, most of which is used as such in the fertilizer and chemical industries. Some of this may be treated with sodium sulphate to produce sulphate of potash.

In the New Mexico plants, the crude ore, which resembles rock salt, is mined and crushed. Some of this is used directly for fertilizer under the name of manure salts. These consist of muriate of potash with sodium chloride and other impurities present. However, most of the raw salts are sent to the refineries where the impurities are removed, producing high-grade muriate of potash for fertilizer and chemical use. Some of the muriate is treated with sulphuric acid to make sulphate of potash with hydrochloric acid as a by-product.

At one of the mines a natural deposit of potash and magnesium sulphates, called langbeinite, occurs. This is ground and used as such after treatment to remove some of the impurities, or it is treated with potassium chloride to produce straight sulphate of potash with magnesium chloride as a by-product.

The potash salts commonly occurring on the fertilizer market are:

Muriate of potash, containing 80-99% potassium chloride, equivalent to 50 -62½% K_2O.

Sulphate of potash, containing 90-96% potassium sulphate, equivalent to 48-52% K_2O.

Manure salts, containing 22-26% K_2O in the form of muriate of potash.

Sulphate of potash-magnesia, containing 22-26% K_2O in the form of sulphate of potash and 10-18% magnesium oxide. in the form of magnesium sulphate.

By far the greatest part of the potash used in agriculture is in the form of high-grade muriate since this is the cheapest per pound of plant food and is satisfactory for nearly all conditions. The manure salts may be more economical at points where shipping costs per pound of potash contained do not make them more expensive than the muriate form. Sul-

phate of potash, since it is a manufactured product, costs more per pound of plant food than muriate and its uses is therefore restricted to those crop or soil conditions where a high chloride content in the fertilizer is not desirable. Sulphate of potash-magnesia is used where the sulphate form of potash is desired and where magnesium also is needed.

The production at all of these plants has been constantly increased, and now when European sources are again cut off and America's need for potash has increased from a recorded importation of 1,400 tons of potash salts in 1871 to an estimated consumption of well over 1,000,000 tons in 1941, this relatively new American industry is proving itself equal to the demands being placed upon it.

NITROGEN FROM COTTONSEED

Many experiments have shown that the nitrogen in cottonseed and other vegetable meals is rapidly converted into available nitrogen in the soil. Experiments reported by Leland Burkhart of the North Carolina Experiment Station on four different soil types show that, on the average, 82 per cent of the nitrogen in the cottonseed meal was converted to the ammonia and nitrate forms in 21 days after application.

FERTILIZERS FOR VEGETABLES AND FRUITS

(Continued from page 9)

square feet of the asparagus bed at each application should be sufficient for even the least fertile soils."

Quality Celery Requires Special Fertilization

Connecticut recommendations for early celery with 10 to 20 tons of manure per acre call for 1,000 pounds of a 5-10-10 fertilizer on light loam and fine sandy loam, 1,400 pounds of a 5-8-7 fertilizer on light sandy soil, 1,000 pounds of a 5-10-5 on heavier loam and silt loam soils, and 800 pounds of a 7-7-7 fertilizer on soils of high residual fertility with favorable phosphoric acid and potash tests. For late celery it is recommended that the amount of fertilizer used be about 1/5 less than mentioned above. A practice becoming more common is to side-dress three or four times with 150 pounds of nitrate of soda and 50 pounds of muriate of potash. The extra application of potash seems to firm the stalks. This tends to prevent the celery from being pithy or hollow and adds to the quality and crispness.

About Soybean Fertilization

A combination of circumstances has made soybeans a very important crop for Delaware farmers in 1942. The drought prevailing during a great part of 1941 ruined a great many seedings made for hay. Soybeans are the best available annual crop that may be used to replace this hay acreage. When the soybeans are seeded broadcast with a drill, the fertilizer should always be applied first in a separate operation. If seeded with a corn planter in rows, the fertilizer may be applied in bands through the use of a fertilizer attachment. On the average Delaware farm a 2-8-10 or 0-12-12 fertilizer is recommended at 200 to 400 pounds per acre.

Fertilizing Soybeans in New Jersey

Regarding fertilization of soybeans, the New Jersey Experiment Station advises: "If planted the year after a well-manured or well-fertilized crop, it is usually unnecessary to apply any fertilizer for soybeans; otherwise it will probably pay to use from 200 to 300 pounds per acre of a mixture such as 0-12-12." Care should be taken to apply the fertilizer broadcast considerably before planting.

Boron Corrects Internal Cork in Apples

In Bulletin 446, Annual Report of the Connecticut Experiment Station at New Haven, Dr. Morgan writes that during the 1939 season the apple crop in many orchards of the State was severely damaged by a physiological disease known as "internal cork." Samples of soil taken from many of these orchards were studied in greenhouse pot experiments and laboratory analyses. Alfalfa served as an indicator crop to confirm boron deficiency, since it shows characteristic symptoms called "alfalfa yellows" when the soil supplies an insufficient amount of this element. In all of the samples shown to be deficient by the alfalfa test, the trouble was corrected by applications of boron equal to 10 lb. of commercial borax per acre.

(Continued on page 24)

See Page 4

New Jersey Orchard Fertilizer Practices

Professor M. A. Blake of the New Jersey Experiment Station addressing the Massachusetts Fruit Growers Association at Worcester, Massachusetts, last January on the nutrition of the apple tree said, "Going back to the early years of the 20th century Dr. E. B. Voorhees, Director of the New Jersey Experiment Station at that time, recommended that all producers of horticultural crops use complete fertilizers. His suggestion was to apply lime, potash, and bone or acid phosphate as a basic treatment and nitrogen as needed." According to Professor Blake this is fundamental in any Coastal Plain region or where the soil is not regarded as fertile. Today on soils of low fertility he recommends 600 to 800 pounds per acre of a 5-10-5 fertilizer and on soils of good fertility which support good to heavy growth of cover crops 500 to 800 pounds of a fertilizer such as a 3-12-6. On orchards which are highly vegetative and for varieties such as the Baldwin, Paragon, and McIntosh, an 0-14-7 fertilizer, no tillage, and only light pruning are recommended.

Orchard Fertilization for the Duration

Anthony and Ruef of Pennsylvania State College advise, "Apple trees require nitrogen in largest amounts during the first month in spring after leaf buds start to grow. This demand must be met either from reserves in the soil or from the fertilizer bag . . .Orchardists who have adapted some form of sod rotation in recent years are now in a fortunate position . . . If the supply of organic matter has been well built up, an occasional cultivation following one in early spring will release enough plant food to carry the trees up to the 'June' drop . . . However, in most orchards a ring application of two to three pounds of nitrate of soda (or its equivalent) per tree should be made in late May or early June to secure the amount of terminal growth desired and to set a full crop of fruit. Phosphorus and potassium in the soil must be sufficient to assure a good growth of weeds or a seeded cover crop later in the season. If both have been supplied regularly in recent years, they may be omitted, otherwise a broadcast application of 150 to 300 pounds of superphosphate and 50 to 100 pounds of muriate of potash per acre will supply a reserve for cover growth . . . Peaches require a longer growing season and a more sustained supply of soil nitrogen than apples, therefore a ring application of one and one-half to two pounds of nitrate of soda or its equivalent should be made per tree just before bloom and a second application in early summer. Phosphate and potash should be supplied as for apple orchard."

Does Potash Improve Fruit Color?

In answer to this question Dr. Heinricke of Cornell University says, "Potash does not specifically affect color. Elements such as boron, magnesium, potash, and phosphorus affect color only as they affect the general health of the tree. Abnormalities in the growth of trees or fruit may indicate a shortage of these. Nitrogen has a very substantial effect on color. It reduces the color, and if you are having difficulty with color, ease up on the nitrogen. Do not get the notion you can grow trees without potash or nitrogen."

Surface Nutrients in Orchards

Among all the desirable features of cover crops in orchards, one of the most interesting according to the New Jersey Experiment Station is the ability of a cover crop to translocate plant nutrients from the surface to the subsoil, where they are made available to the tree roots. Work recently completed in the horticulture department shows, for example, that a good crop of sweet clover may thus translocate phosphorus equivalent to 85 pounds per acre of a 5-10-5 fertilizer, and potassium equivalent to 350 pounds of the same fertilizer. Similar results were obtained with alfalfa. The Station found that tree roots are also capable of translocating nutrients in amounts adequate to maintain good root activity in the subsoil, even though the respective nutrients are entirely lacking at that level. Thus, if the subsoil is in good physical condition and contains no interfering substances or layers, good root growth may be maintained by surface applications of nutrients. This was demonstrated in the case of phosphorus, potassium, and calcium.

GRASSELLI RESIGNS FROM DU PONT CO.

T. S. Grasselli of Cleveland resigned May 18th as a vice-president and a member of the board of directors, of E. I. du Pont de Nemours & Co., Wilmington. His resignation was caused by ill health and will become effective as of May 31st.

Mr. Grasselli has devoted his business life to the chemical industry which he entered in 1893, following his graduation from Mary's College. He joined the Grasselli Chemical Company in Cleveland, founded by his grandfather in 1893, and served in all departments until 1916, when he was elected president.

After the merger of the Grasselli Company with the du Pont Company in 1929, he became a director of the latter company and continued as president of the Grasselli organization. He was elected a vice-president of the du Pont company on January 20, 1936, and served as a member of the executive committee for several years. He retired from active work November 14, 1939.

PRIORITY FORMS AGAIN REVISED

A revised form of application for priority assistance under the Production Requirements Plan to be used for the third quarter of 1942 was announced on May 14th by J. S. Knowlson, Director of Industry Operations. New instructions to applicants for preference ratings under the Production Requirements Plan will allow them to omit a considerable part of the information which has previously been required. Users of materials will also be able to supply the same reports on PRP applications which they are now preparing in answer to the general metals questionnaire, Form PD-275, and duplication of paper work will thus be avoided.

Under the new program, assignment of ratings to PRP applicants will depend increasingly on the nature and use of the applicant's product, less on the pattern of preference ratings on the orders which he has on his books. For example, high ratings would be assigned to a manufacturer of parts which would ultimately be incorporated in military planes or tanks, without his having to prove that 75 per cent of his orders were A-1-a, 15 per cent A-1-b, etc.

For the present, the revised PD-25A application form for the Production Requirements Plan which was prepared for the April-June quarter will continue to be used, but the instructions specify that many of the columns may be left blank. These instructions are now available in War Production Board field offices, and applications on the simplified basis will be accepted, effective immediately.

NONMETALLIC MINERALS BILL SIGNED BY PRESIDENT

President Roosevelt signed S. 1331 authorizing the exploitation of silica sand and other nonmetallic minerals in lands previously withdrawn by executive order in the Valley of Fire region, west of Lake Mead in Nevada. The bill is an amendment to the act of February 25, 1920, to promote the mining of coal, phosphate, oil, oil shale, gas and sodium on the public domain. The bill authorizes the Secretary of the Interior to lease the lands for the exploitation.

The Best Plant Food for Victory
WAR BONDS

BUYERS' GUIDE

A CLASSIFIED INDEX TO ALL THE ADVERTISERS IN "THE AMERICAN FERTILIZER"

This list contains representative concerns in the Commercial Fertilizer Industry, Including fertilizer manufacturers, machinery and equipment manufacturers, dealers in and manufacturers of commercial fertilizer materials and supplies, brokers, chemists, etc.
For Alphabetical List of Advertisers, see page 33.

ACID BRICK
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

ACID EGGS
Chemical Construction Corp., New York City.

ACIDULATING UNITS
Chemical Construction Corp., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

AMMO-PHOS
American Cyanamid Co., New York City.

AMMONIA—Anhydrous
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

AMMONIA LIQUOR
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Hydrocarbon Products Co., New York City.

AMMONIA OXIDATION UNITS
Chemical Construction Corp., New York City.

AMMONIATING EQUIPMENT
Sackett & Sons Co., The A. J., Baltimore, Md.

AMMONIUM NITRATE SOLUTIONS
Barrett Division, The, Allied Chemical & Dye Corp., New York City.

AUTOMATIC ELEVATOR TAKEUPS
Sackett & Sons Co., The A. J., Baltimore, Md.

BABBITT
Sackett & Sons Co., The A. J., Baltimore, Md.

BAGS AND BAGGING—Manufacturers
Bagpak, Inc., New York City.
Bemis Bro. Bag Co., St. Louis, Mo.

BAGS—Cotton
Bemis Bro. Bag Co., St. Louis, Mo.

BAGS—Paper
Bagpak, Inc., New York City.
Bemis Bro. Bag Co., St. Louis, Mo.

BAGS (Waterproof)—Manufacturers
Bemis Bro. Bag Co., St. Louis, Mo.

BAGS—Dealers and Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Wellmann, William E., Baltimore, Md.

BAGGING MACHINES—For Filling Sacks
Atlanta Utility Works, East Point, Ga.
Bagpak, Inc., New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

BAG PILERS
Link-Belt Company, Philadelphia, Chicago.

BEARINGS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

BELT LACING
Sackett & Sons Co., The A. J., Baltimore, Md.

BELTING—Chain
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

BELTING—Leather, Rubber, Canvas
Sackett & Sons Co., The A. J., Baltimore, Md.

BOILERS—Steam
Atlanta Utility Works, East Point, Ga.

BONE BLACK
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Huber & Company, New York City.

BONE PRODUCTS
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

BORAX AND BORIC ACID
American Potash and Chem. Corp., New York City.
Pacific Coast Borax Co., New York City.

BROKERS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Dickerson Co., The, Philadelphia, Pa.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
Keim, Samuel L., Philadelphia, Pa.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

BUCKETS—Elevator
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

A Classified Index to Advertisers in "The American Fertilizer"

BUYERS' GUIDE

For an Alphabetical List of all the Advertisers, see page 33

BUCKETS—For Hoists, Cranes, etc., Clam Shell, Orange Peel, Drag line, Special; Electrically Operated and Multi Power
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.

BURNERS—Sulphur
Chemical Construction Corp., New York City.

BURNERS—Oil
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.

CABLEWAYS
Hayward Company, The, New York City.

CARBONATE OF AMMONIA
American Agricultural Chemical Co., New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.

CARS—For Moving Materials
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CARTS—Fertilizer, Standard and Roller Bearing
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

CASTINGS—Acid Resisting
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.

CASTINGS—Iron and Steel
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CEMENT—Acid-Proof
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

CHAIN DRIVES—Silent
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHAINS AND SPROCKETS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHAMBERS—Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

CHEMICAL APPARATUS
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

CHEMICALS
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
Bradley & Baker, New York City.
DuPont de Nemours & Co., E. I., Wilmington, Del.
Huber & Company, New York City.

CHEMICALS—Continued
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Phosphate Mining Co., The, New York City.
Wellmann, William E., Baltimore, Md.

CHEMICAL PLANT CONSTRUCTION
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CHEMISTS AND ASSAYERS
Gascoyne & Co., Baltimore, Md.
Shuey & Company, Inc., Savannah, Ga.
Stillwell & Gladding, New York City.
Wiley & Company, Baltimore, Md.

CLUTCHES
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

CONCENTRATORS—Sulphuric Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

CONDITIONERS AND FILLERS
American Limestone Co., Knoxville, Tenn.
Dickerson Co., The, Philadelphia, Pa.
Phosphate Mining Co., The, New York City.

CONTACT ACID PLANTS
Chemical Construction Corp., New York City.

COPPER SULPHATE
Tennessee Corporation, Atlanta, Ga.

COTTONSEED PRODUCTS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

CRANES AND DERRICKS
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

CYANAMID
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Jett, Joseph C., Norfolk, Va.
Wellmann, William E., Baltimore, Md.

DENS—Superphosphate
Chemical Construction Corp., New York City.
Stedman's Foundry and Mach. Works, Aurora, Ind.

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Stedman's Foundry and Mach. Works, Aurora, Ind.

DRYERS—Direct Heat
Sackett & Sons Co., The A. J., Baltimore, Md.

DRIVES—Electric
Link-Belt Company, Philadelphia, Chicago.

DUMP CARS
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

DUST COLLECTING SYSTEMS
Sackett & Sons Co., The A. J., Baltimore, Md.

ELECTRIC MOTORS AND APPLIANCES
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

ELEVATORS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

ELEVATORS AND CONVEYORS—Portable
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

ENGINEERS—Chemical and Industrial
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

ENGINES—Steam
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

EXCAVATORS AND DREDGES—Drag Line and Cableway
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Link Belt Speeder Corp., Chicago, Ill., and Cedar Rapids, Iowa.

FERTILIZER MANUFACTURERS
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Farmers Fertilizer Co., Columbus, Ohio
International Minerals & Chemical Corporation, Chicago, Ill.
Phosphate Mining Co., The, New York City.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

FISH SCRAP AND OIL
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Wellmann, William E., Baltimore, Md.

FOUNDERS AND MACHINISTS
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GARBAGE TANKAGE
Wellmann, William E., Baltimore, Md.

GEARS—Machine Moulded and Cut
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

GEARS—Silent
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

GELATINE AND GLUE
American Agricultural Chemical Co., New York City.

GUANO
Baker & Bro., H. J., New York City.

HOISTS—Electric, Floor and Cage Operated, Portable
Hayward Company, The, New York City.

HOPPERS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

IMPORTERS, EXPORTERS
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Wellmann, William E., Baltimore, Md.

IRON SULPHATE
Tennessee Corporation, Atlanta, Ga.

INSECTICIDES
American Agricultural Chemical Co., New York City.

LACING—Belt
Sackett & Sons Co., The A. J., Baltimore, Md.

LIMESTONE
American Agricultural Chemical Co., New York City.
American Limestone Co., Knoxville, Tenn.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
McIver & Son, Alex. M., Charleston, S. C.
Wellmann, William E., Baltimore, Md.

LOADERS—Car and Wagon, for Fertilizers
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Acid Making
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.
Duriron Co., Inc., The, Dayton, Ohio.
Fairlie, Andrew M., Atlanta, Ga.
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Coal and Ash Handling
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Elevating and Conveying
Atlanta Utility Works, East Point, Ga.
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Grinding and Pulverizing
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
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Duriron Co., Inc., The, Dayton, Ohio.

MACHINERY—Tankage and Fish Scrap
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MAGNETS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

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Tennessee Corporation, Atlanta, Ga.

MIXERS
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Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

NITRATE OF SODA
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
Bradley & Baker, New York City.
Chilean Nitrate Sales Corp., New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

NITRATE OVENS AND APPARATUS
Chemical Construction Corp., New York City.

NITROGEN SOLUTIONS
Barrett Division, The, Allied Chemical & Dye Corp., New York City.

NITROGENOUS ORGANIC MATERIAL
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
DuPont de Nemours & Co., Wilmington, Del.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Smith-Rowland Co., Norfolk, Va.
Wellmann, William E., Baltimore, Md.

NOZZLES—Spray
Monarch Mfg. Works, Philadelphia, Pa.

PACKING—For Acid Towers
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

PANS AND POTS
Stedman's Foundry and Mach. Works, Aurora, Ind.

PHOSPHATE MINING PLANTS
Chemical Construction Corp., New York City.

PHOSPHATE ROCK
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Charleston Mining Co., Inc., Richmond, Va.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Phosphate Mining Co., The, New York City.
Ruhm, H. D., Mount Pleasant, Tenn.
Schmaltz, Jos. H., Chicago, Ill.
Southern Phosphate Corp., Baltimore, Md.
Wellmann, William E., Baltimore, Md.

PIPE—Acid Resisting
Duriron Co., Inc., The, Dayton, Ohio.

PIPES—Chemical Stoneware
Chemical Construction Corp., New York City.

PIPES—Wooden
Stedman's Foundry and Mach. Works, Aurora, Ind.

PLANT CONSTRUCTION—Fertilizer and Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

POTASH SALTS—Dealers and Brokers
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

POTASH SALTS—Manufacturers
American Potash and Chem. Corp., New York City.
Potash Co. of America, New York City.
International Minerals & Chemical Corp., Chicago, Ill.
United States Potash Co., New York City.

PULLEYS AND HANGERS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

PUMPS—Acid-Resisting
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

PYRITES—Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., New York City.
Wellmann, William E., Baltimore, Md.

QUARTZ
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

RINGS—Sulphuric Acid Tower
Chemical Construction Corp., New York City.

ROUGH AMMONIATES
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Schmaltz, Jos. H., Chicago, Ill.
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SCRAPERS—Drag
Hayward Company, The, New York City.

SCREENS
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SEPARATORS—Air
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SEPARATORS—Including Vibrating
Sackett & Sons Co., The A. J., Baltimore, Md.

SEPARATORS—Magnetic
Sackett & Sons Co., The A. J., Baltimore, Md.
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SHAFTING
Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SHOVELS—Power
Link-Belt Company, Philadelphia, Chicago.
Link-Belt Speeder Corp., Chicago, Ill., and Cedar Rapids, Iowa.
Sackett & Sons Co., The A. J., Baltimore, Md.

SPRAYS—Acid Chambers
Monarch Mfg. Works, Inc., Philadelphia, Pa.

SPROCKET WHEELS (See Chains and Sprockets)

STACKS
Sackett & Sons Co., The A. J., Baltimore, Md.

SULPHATE OF AMMONIA
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Barrett Division, The, Allied Chemical & Dye Corp., New York City.
Bradley & Baker, New York City.
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SULPHUR
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Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
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Schmaltz, Jos. H., Chicago, Ill.
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SUPERPHOSPHATE—Concentrated
Armour Fertilizer Works, Atlanta, Ga.
International Minerals & Chemical Corporation, Chicago, Ill.
Phosphate Mining Co., The, New York City.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

SYPHONS—For Acid
Monarch Mfg. Works, Inc., Philadelphia, Pa.

TALLOW AND GREASE
American Agricultural Chemical Co., New York City.

TANKAGE
American Agricultural Chemical Co., New York City.
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Jett, Joseph C., Norfolk, Va.
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Smith-Rowland, Norfolk, Va.
Wellmann, William E., Baltimore, Md.

TANKAGE—Garbage
Huber & Company, New York City.

TANKS
Sackett & Sons, Co., The A. J., Baltimore, Md.

TILE—Acid-Proof
Charlotte Chem. Laboratories, Inc., Charlotte, N. C

TOWERS—Acid and Absorption
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.

UNLOADERS—Car and Boat
Hayward Company, The, New York City.
Sackett & Sons Co., The A. J., Baltimore, Md.

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UREA-AMMONIA LIQUOR
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VALVES—Acid-Resisting
Atlanta Utility Works, East Point, Ga.
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
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